

The Effects of Derivational Suffix Instruction on English Vocabulary Knowledge in Thai High School Learners

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Article information	Abstract
Article history:	
Received: 8 May 2023	This study investigated the effect of derivational suffix instruction on vocabulary knowledge.
Accepted: 6 Oct 2023	Fifty-eight high school learners were recruited to participate in the study. The learners were divided into control ($n = 29$)
Available online: 3 May 2024	and experimental ($n = 29$) groups. The experimental group received a Fundamental English II course with an emphasis on derivational suffix instruction, whereas the control group only received a Fundamental English II course. Two receptive and productive derivational suffix tests were designed and validated to measure high school learners' suffix knowledge. A questionnaire was also administered to explore the experimental participants' perceptions of derivational suffix instruction in facilitating vocabulary knowledge. Descriptive and inferential statistics were conducted to analyse the quantitative data, including pair-sample t-tests and independent-sample t-tests. The results showed that high school learners in both groups performed significantly better on the posttest than on the pretest. The results also revealed that experimental learners significantly outperformed their control counterparts. These findings suggest the efficacy of derivational suffix instruction on English vocabulary knowledge in Thai high school learners. In addition, the questionnaire analysis indicated that high school learners had positive perceptions towards derivational suffix instruction as a method to improve their vocabulary knowledge. Together, the current findings highlight the importance of derivational suffixes in vocabulary acquisition and development. Other relevant implications and suggestions for future studies are also discussed.
Keywords:	
Derivational suffixes	
Vocabulary knowledge	
Thai high school learners	

INTRODUCTION

Vocabulary knowledge is fundamental to learning English as a second or foreign language (L2) and achieving proficiency (Dawson et al., 2021; Laufer, 2017; Nation, 2022; Sasao & Webb, 2017; Schmitt, 2010; Webb & Nation, 2017). However, acquiring a sufficient vocabulary is a significant challenge due to individual learner differences, language exposure, and learning strategies (Nation, 2022; Yunus & Mohamad, 2016). Research indicates that to comprehend authentic texts and spoken discourse effectively, L2 learners require a vocabulary size of

approximately 8000 to 9000 and 6000 to 7000 words, respectively (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006; Schmitt et al., 2011). Yet, the average vocabulary size of EFL learners falls significantly short, highlighting the gap in learners' vocabulary size and the requirements for L2 mastery (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006).

The debate on the most effective vocabulary teaching strategies is ongoing, with evidence supporting intentional techniques, such as the use of word cards and exploring word parts, for fostering vocabulary growth (Akbulut, 2017; Nation, 2022; Schmitt, 2010). These intentional strategies, underscored by the concept of noticing, are deemed more effective than incidental learning, which relies on extensive exposure to the language (Elgort, 2011; Mochizuki & Aizawa, 2000; Nation, 2022; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002).

Additionally, understanding a word's morphological structure has proven beneficial in learning vocabulary by identifying unfamiliar words' meanings and syntactic categories (Nation, 2022). Early vocabulary learning stages significantly benefit from recognizing the morphemic structure in complex words, leveraging more familiar vocabulary items to understand new words (Nagy et al., 2014; Schmitt & Meara, 1997). The significance of morphological awareness in vocabulary acquisition, especially among young learners, has been well-documented, suggesting the integration of morphological knowledge into the vocabulary learning curriculum (Carlisle, 2010; Goodwin & Ahn, 2013; Schmitt & Zimmerman, 2002).

In English as a Foreign Language (EFL) contexts, including Thailand, effective vocabulary teaching strategies from primary through tertiary education are critical due to students' vocabulary sizes lagging behind academic requirements (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006). A focused investigation on teaching derivational suffixes, which are morphemes that modify word meanings and parts of speech, reveals substantial benefits for vocabulary acquisition and language skills (Akbulut, 2017; Carlisle, 2010; Kieffer & Lesaux, 2012; Schmitt, 2010; Schmitt & Meara, 1997). Derivational suffixes offer a systematic approach to navigating the complexities of English vocabulary, which is essential for academic writing and professional communication (Akbulut, 2017; Tyler & Nagy, 1989; Schmitt & Meara, 1997).

Given the pivotal role of morphological knowledge in enhancing vocabulary growth and language competence, this study aimed to explore the effects of derivational suffix instruction on Thai high school learners' English vocabulary learning. The study sought to answer the following research questions:

1. To what extent does derivational suffix instruction affect Thai high school learners' English vocabulary learning?
2. What are Thai high school learners' perceptions of the derivational suffix instruction?

By addressing these questions, the current study underscores the importance of incorporating morphological knowledge into EFL education, highlighting its significant benefits for vocabulary acquisition, expansion and pedagogical practice.

LITERATURE REVIEW

Vocabulary knowledge

Several vocabulary scholars (Henriksen, 1999; Laufer, 1992; Nation, 2022; Schmitt, 2014) have conceptualised vocabulary knowledge, which is interchangeably used as word knowledge in this study. Henriksen (1999) described word knowledge as multidimensional knowledge elements, including partial-to-precise knowledge, depth of knowledge and receptive-productive distinction. The partial-to-precise element involves a developmental continuum of word knowledge, progressing from superficial recognition to full mastery of the word. The second element of word knowledge focuses on the incremental degrees of in-depth knowledge, which requires different measurement formats. This conceptualisation aligns with Schmitt's (2014) framework of word knowledge. The final notion of word knowledge encompasses the receptive-productive continuum, which is called passive and active knowledge (Laufer, 1998). This conceptualisation is seen as the ability to know, control, and use the word in actual communication. Recently, Nation (2022) described the multi-component nature of word knowledge, which includes form, meaning, and use. These components are further classified into receptive and productive word knowledge (Nation, 2022). The receptive knowledge of the word is seen as the ability to remember a word, at least to some extent and retrieve its meaning in listening and reading. In contrast, productive word knowledge is described as the learner's ability to recall and use a word in speaking and writing.

The role of morphological knowledge in vocabulary knowledge

Morphological knowledge, often called affix knowledge or word part knowledge, is essential to vocabulary knowledge. It is defined as the ability to recognise internal vocabulary structures and deconstruct vocabulary items into smaller words to give meaning to language (Carlisle, 2000; Lieber, 2010; Sukying, 2018). Words may contain one morpheme, for example, *act*, or multiple morphemes, e.g., *actor*. In this example, the smallest morpheme *-or* gives a meaningful word to change the base word in a verb (*act*) to a noun by adding *-or*, i.e., *actor*. An additional morpheme can be added (-s) to transform an *actor* into *actors* as a plural.

Morphological knowledge can be divided into knowledge of inflections and derivations. Inflections involve nominal numbers, grammatical functions (nouns, verbs), and comparative and superlative degrees of adverbs and adjectives. Indeed, inflections never change the grammatical property of the newly attached words and do not involve word formation. Derivations, interchangeably used as derivatives in this paper, include prefixes and suffixes. Prefixes are meaningful lexical constituents attached at the beginning of a word and often change the meaning of the word. Examples of prefixes include *un-*, *im-*, *dis-*, *mis-*, *re-* and *pre-*. Suffixes (e.g., *-able*, *-ness*, *-or*, *-er*, *-ful*) are lexical constituents added to the end of a word, and these lexicons usually designate syntactic functions of the attached word. For instance, the nominal word of use can be assigned as an adjective by adding the suffix *-ful* (useful) and designating an adverb by adding *-ly* (usefully). Another example is a noun (care), which can be designated as an adjective by adding *-ful* (careful) and an adverb by adding *-ly* (carefully). With the significance of the derivational affixes, the present study primarily focused on the role of derivational suffixes in vocabulary learning and expansion in a Thai EFL setting.

L2 vocabulary research has shown the significance of derivational knowledge in vocabulary pedagogy (Nagy et al., 2014; Nation, 2022). Derivational knowledge includes knowledge of prefixes and suffixes, which function together to constitute more complex words (Webb & Nation, 2017). This knowledge is essential for vocabulary learning and development for several reasons. First, derivational knowledge can help learners remember new lexical items based on known items or parts they contain (e.g., Nation, 2022; Sasao & Webb, 2017). For example, knowledge of the suffixes *-or* and *-er*, which refer to ‘the person who does the action’, will make the words *creator* and *employer* easier for learners to recognise. Derivational knowledge can also assist learners in guessing the meaning of unknown words (Goodwin & Ahn, 2013). For example, if learners are unfamiliar with the word *employer* but are familiar with the word *employ* and the derivational affix *-er*, they will feasibly recognise the meaning of *employer*. Finally, derivational knowledge can offer learners more opportunities for repetition because an encounter with a member within the same word family – a group of words that share the lexical stem – is likely to be a meaningful repetition for the other members (Cobb & Laufer, 2021). That is, *employment* can be a repetition for *employ* and *employer*. For these reasons, derivational knowledge can help reduce the burden of learning new words and help learners improve their vocabulary knowledge, including form, meaning and use. Given the importance of derivational knowledge, researchers have suggested that derivational knowledge and vocabulary learning strategies deserve explicit teaching in an EFL classroom (e.g., Mochizuki & Aizawa, 2000; Nation, 2022; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002).

A number of studies have measured EFL learners’ derivational knowledge (Hayashi & Murphy, 2011; Ishii & Schmitt, 2009; Mochizuki & Aizawa, 2000; Schmitt & Meara, 1997). These studies consistently indicated that EFL learners had incomplete derivational knowledge, suggesting that learners have difficulty acquiring derived forms. Perhaps the word families need to be reconsidered for a unit for teaching vocabulary (Schmitt, 2010, 2014). However, Nation (2022) argues one possible reason for EFL learners’ incomplete knowledge of derivational knowledge could be the lack of derivational suffix instruction in the EFL context.

Research has highlighted the crucial role of morphological knowledge in both the acquisition and expansion of vocabulary (Carlisle, 2010; Goodwin & Ahn, 2013; Hayashi & Murphy, 2011; Mochizuki & Aizawa, 2000; Sasao & Webb, 2017; Schmitt & Meara, 1997). Despite this, to our knowledge, a limited number of studies have explored the impact of affix instruction on vocabulary knowledge in Thai EFL contexts. These studies have shown significant benefits of morphological knowledge of vocabulary enhancement, particularly among Thai university learners (Katchamat, 2020; Tarat, 2019; Ward & Chuenjundaeng, 2009). Other studies focusing on Thai primary school students, such as that by Matwangsaeng and Sukying (2023), revealed that morphological instruction significantly improved vocabulary knowledge, both in understanding and usage, emphasizing the value of early morphological knowledge in second language learning. However, despite these insights into the effects of affix teaching on vocabulary acquisition among primary and university students, a research gap exists in the exploration of derivational suffix instruction within EFL contexts, especially concerning high school students. This gap points to a need for further investigation into the role of affix instruction in enhancing vocabulary learning at the high school level.

Overall, the review of existing literature indicates that knowledge of derivational suffixes serves as an indicator of vocabulary knowledge. Based on the literature findings, it has also been argued that vocabulary growth is attributed to understanding suffixes. Consequently, a profound comprehension of derivational suffixes and the process of suffixation in English proves beneficial for language learners, especially those undergoing formal assessments. It is equally crucial for learners to identify the range of available derivational suffixes and master their correct and efficient application through deliberate instruction of this knowledge. Hence, this study aims to enhance the prospects of Thai high school students by integrating an extensive array of vocabulary words into their everyday curriculum. Furthermore, cultivating an awareness of derivational suffixes will bolster learners' capacity to incorporate these suffixes into their vocabulary enhancement effort.

METHODOLOGY

Participants and setting

The current study was conducted with grade 8 students at a local high school under government administration in northeast Thailand. Fifty-eight EFL high school learners, aged 14-15, voluntarily participated in the study. The participants were divided into two groups: experimental and control groups ($n = 29$ per group). The participants were classified into the A1 CEFR level of English, measured by the Cambridge English Language Assessment. Moreover, the participants' vocabulary size (the number of words known by the participants) was small, as measured by Schmitt et al.'s (2011) Vocabulary Level Test. All participants generally used L1 (Thai language) to communicate with their friends.

The participants study English as a mandatory subject of their school curriculum. Thus, participants had a minimum of 1 year to learn English in high school and six years in primary education. The participants were unfamiliar with the English language, including both vocabulary and grammatical structure. Indeed, the participants received only a few hours of English lessons at the school. In addition, they had limited access to English language media resources, such as the internet, news articles, movies, radio, smartphones, and intelligent television. The teacher regularly used native Thai to teach English at school, although English textbooks and materials were used for teaching in the classroom.

The experimental group was taught derivational suffix strategies, whereas the control group had no such instruction. Indeed, the participants in the control group received implicit learning derivational suffixes as they appeared in school textbooks. The majority of the instruction was conducted in the participant's native language (L1) as opposed to English to save class time and guarantee that the participants comprehended the class activities.

Research instruments

The Word Segmentation Test (WST)

The WST was developed based on Hayashi and Murphy (2011) in order to measure the participant's vocabulary knowledge, especially the ability to deconstruct complex words.

This test included 20 items. Regarding the instructions of WST, the participants were asked to break down vocabulary components (derivational suffixes) into smaller morphemes and the smallest parts of a language. For example, e.g., *jump* (verb) → *jumper* (noun) + *-er* (suffix). The word “*jumper*” was segmented into smaller morphological parts through analysis of semantic transparency. The participants received one point for the correct answer in one morpheme and no points for an incorrect answer, such as a wrong root word or no answer. English derivational suffixes were used based on Bauer and Nation’s (1993) word family. Below are some examples from the WST:

harmful	→	harm + ful
brightness	→	bright + ness
employer	→	employ + er

The Suffix Recall Test (SRT)

The SRT was developed based on Sukying (2018) and aimed to measure participants’ vocabulary knowledge by producing the right form of the target vocabulary items with the proper part of speech to complete a given sentence. The participants were also required to mark the part of speech (nouns, verbs, adjectives or adverbs) of the word they thought it missed. This was to ensure that the participants knew the part of speech of the vocabulary item it carries. For example, she is a..... (beauty) girl (beautiful). Here, the participants had to determine the part of speech they thought was missing to complete a sentence with grammatical appropriateness and spelling accuracy. One point was awarded for the correct word, and another point was given if the participants chose the correct part of speech. There were no points for words with the incorrect part of speech; however, minor spelling mistakes were ignored. The SRT comprised 20 items with a total of 40 points. Some example items from the SRT are illustrated below:

1. The necklace is **beautiful**, the bead reminds me of ancient China. (beauty)

Missing derivational suffix			
N	V	Adj.	Adv.
		×	

2. This was not the film in which everyone lived **happily** ever after. (happy)

Missing derivational suffix			
N	V	Adj.	Adv.
			×

Questionnaire

The current study used a 5-point Likert scale questionnaire with 12 items to assess participants’ perceptions of vocabulary learning through derivational suffix instruction. The perceptions in this study referred to the participants’ feelings about vocabulary learning through derivational suffix instruction in the classroom. Participants were asked to rate their perceptions towards derivational suffix instruction using the Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree.

The questionnaire was evaluated for its validity using an Index of Item Objective Congruence (IOC) by five scholars in the field. It was adjusted accordingly before being piloted and then evaluated by Cronbach's alpha to determine its internal consistency (0.92). The questionnaire was also translated into Thai by a professional Thai-English translator. Another translator cross-checked the Thai questionnaire version to ensure the accuracy and simplicity of the language.

Research procedure

Selecting the prompt words

Selecting words for learning is regarded as a major concern for teachers, material developers, and researchers (Read, 2004). L2 research shows that high-frequency words, in a general sense, are words that frequently appear in all types of spoken and written texts, regardless of the specific contexts (Laufer, 2014). Without knowledge and fluent access to these words, students would suffer in L2 comprehension and production (Nation, 2022). Thus, high-frequency words should be prioritized in teaching and learning, especially for lower-level learners (Laufer, 2014). The current study employed Laufer and Nation's (2012) proposed selection criteria for vocabulary teaching, which included frequency, usefulness and difficulty (learnability). The prompt words were chosen from the student's textbook 'Access 2'. Specifically, the procedure for selecting the word prompts was as follows:

1. The teacher studied the primary English language objects and analyzed them for vocabulary selection.
2. The prompt words were selected to cover all the units from the book. The prerequisite for selecting words was adding a minimum of two suffixes to each prompt word and changing parts of speech, including nouns, verbs, adjectives, and adverbs. Proper and collective nouns and compounds were excluded. The total number of selected word prompts was 66.
3. The researcher checked 66 words against the New General Service List (NGSL); three words were excluded (Browne et al., 2013). The vocabulary based on NGSL includes approximately 2,000 high-frequency words for learners in second language acquisition and covers 92% of general English texts.
4. The researcher piloted the 63 words with participants who were asked to select the words with known and unknown meanings. Participants were given 60 minutes to complete this task.
5. After the vocabulary checklist was piloted, the participants' least and most known words were excluded.
6. Finally, the researcher designed the tests and the lesson plans. The lesson plans for the experimental group were an hour of derivational suffix instruction a week, adding up to a total of 13 hours of suffix instruction.

The final list of the 63 words was applied to lesson plans for classroom practice. However, only 20 words were included in receptive and productive vocabulary knowledge measures, and these words were excluded in explicit teaching in English classrooms. The 20 words for the tests were: *modernism* (modern + ism), *presentation* (present + ation), *harmful* (harm + ful), *minder* (mind + er), *lovely* (love + ly), *joyous* (joy + ous), *finally* (final + ly), *development* (develop + ment), *useable* (use + able), *socialist* (social + ist), *player* (play + er), *realize* (real + ize), *nationally* (nation + al + ly), *professional* (profession + al), *careful* (care + ful), *peaceable* (peace + able), *moralism* (moral + ism), *painlessness* (pain + less + ness), *thankful* (thank + ful), and *powerless* (power + less).

Selecting the target derivational suffixes

The current study used Bauer and Nation's (1993) word family model to select the target suffixes. Derivational suffixes used in the current study included derived forms of Levels 3 (the most frequent and irregular derivational affixes) and 4 (frequent orthographically regular affixes). Suffixes in Levels 3 and 4 frequently occurred in the textbook used for English courses at the school ('Access 2'). Moreover, the derivational suffixes listed in Levels 3 and 4 are regarded as a basis for the learning and teaching of English and are widely accepted for word-building devices (Bauer & Nation, 1993). In addition, concerning the Thai National Curriculum, all target suffixes employed in the current study were common. High school students in Thailand might be expected to know them, at least to some extent. The study excluded Level 1 (each form is a different word) mainly because of the assumption that students tended to consider *student* and *students* to be related or members of the same word family. The current study also excluded Levels 5 to 7 because these affixes (prefixes and suffixes) infrequently do not occur with the study's target words. Therefore, the target derivational suffixes used in the study consisted of 13 derived forms, including *-able*, *-er*, *-less*, *-ly*, *-ness*, *-al*, *-ation*, *-ful*, *-ism*, *-ist*, *-ize/-ise*, *-ment*, and *-ous*.

Principles of derivational suffix instruction

The suffix instruction for learning new complex words involves several steps. First, the notion of word families is introduced (Bauer & Nation, 1993, Levels 3 to 4) and then unknown words are deconstructed into separate parts. This step requires students to recognise suffixes when they occur in words. Second, students must connect the meaning of the affixes or lexical parts to the word's meaning. This step requires students to know the meanings of the common lexical parts and to re-express the word's direct (dictionary) definition to include the meaning of its baseword (stem) and suffixes. The teacher also needs to explain lexical parts to develop morphological knowledge. The derivational suffixes should be explicitly presented since derivational suffixes indicate the grammatical functions of the words to which they are attached. Then, during learning activities, students should perform lexical-part analysis to deconstruct words and help them learn the crucial affixes. Finally, the student's knowledge of the affixes and their ability to deconstruct words should be tested.

Data collection procedure

The Word Segmentation Test (WST) and the Suffix Recall Test (SRT) were conducted in the first week. The SRT was administered first to avoid the likelihood that participants would draw connections between derivational suffixes on the receptive knowledge test (WST). The experimental group then received a Fundamental English II course and explicit instruction on derivational suffixes. The participants were introduced to the concept of Bauer and Nation's (1993) word families and were taught how to break a multi-part word into smaller parts (e.g., scientist = science + -ist) and reconstruct it to become a complex word using derivational suffixes (e.g., break + -able = breakable).

By contrast, the control group received Fundamental English II classes but received no special training regarding derivational suffixes. Instead, they learned general English through a grammar-translation approach. That is, the participants were directly taught grammar and the meaning of the target words. Both groups received an average of two hours of English classes a week. After the experiment was completed, the SRT and the WST were administered again to determine the effect of derivational suffix instruction. The questionnaire was also given to the experimental group participants to survey their perceptions of derivational suffix instruction in vocabulary learning.

Data analysis

To analyse the scores on the word segmentation and suffix recall tests, SPSS software was used to conduct paired samples t-tests and independent-sample t-tests. The t-tests assessed the learners' learning vocabulary ability before and after teaching derivational suffixes or regular class instruction. Specifically, two means of the same group of participants were compared before and after the teaching period. In addition, the data from the five-point Likert scale questionnaire were quantitatively analysed using descriptive statistics. The results of the questionnaire were interpreted in the following range: 4.50 - 5.00 (Very high), 3.50 - 4.49 (High), 2.50 - 3.49 (Moderate), 1.50 - 2.49 (Low) and 1.00 - 1.49 (Very low).

RESULTS

The effects of derivational suffixes on English vocabulary knowledge

The quantitative data were analysed using descriptive and inferential statistics. Summary descriptive statistics for the derivational suffix knowledge tests are presented in Table 1. The results showed that participants in both groups performed better on the receptive knowledge test than on productive knowledge measures. Specifically, the experimental group participants achieved a mean performance of 47.20% on the WST ($SD = 3.62$) before the intervention, whereas the control participants obtained a mean performance of 46.85% ($SD = 2.21$). On the SRT, the experimental participants achieved a mean performance of 16.85% ($SD = 1.49$), whereas the control participants scored 17.05% ($SD = 1.32$).

Regarding the productive knowledge tasks, the results showed that the experimental participants obtained a mean performance of 16.85% on the SRT ($SD = 1.49$) before the intervention and 33.25% ($SD = 2.02$) after the intervention. Control participants obtained a mean performance of 17.05% ($SD = 1.32$) before the intervention, and 17.05% ($SD = 1.18$) after the intervention. These findings indicate that derivational suffix instruction positively affects vocabulary learning in Thai high school participants.

Skewness and kurtosis figures were also conducted and were within the statistical assumptions of normality of two standard deviations, which was verified to be a normal distribution.

Table 1
Summary of descriptive statistics for the derivational suffix knowledge tests

	Times	Tests	M	(%)	SD	Skew	Kurtosis
Experimental group (n = 29)	Pretest	WST	9.44	47.20	3.62	0.46	-0.96
		SRT	3.37	16.85	1.49	1.27	1.69
	Posttest	WST	13.13	65.65	3.83	0.38	-1.15
		SRT	6.65	33.25	2.02	1.70	5.22
Controlled group (n = 29)	Pretest	WST	9.37	46.85	2.21	-0.22	0.29
		SRT	3.41	17.05	1.32	1.34	2.02
	Posttest	WST	10.34	51.70	2.63	0.21	-0.62
		SRT	3.41	17.05	1.18	0.92	0.97

A dependent-samples t-test analysis was also performed to determine whether there was any significant difference between the derivational suffix knowledge tests before and after the treatment in the same group of participants. Effect sizes (d) were also calculated. As shown in Table 2, the pretest and post-test scores on the receptive test of derivational suffix knowledge (WST) were significantly different for participants in the experimental group, with a large effect size ($t = 12.55, p < 0.001, d = 0.99$). In addition, pretest and post-test scores for the experimental group were also significantly different on the productive test of derivational suffix knowledge (SRT), with a large effect size ($t = 17.10, p < 0.001, d = 1.85$). In contrast, the results from the control group showed that there was only a significant difference between the pretest and post-test in the reception test (WST) but with a small effect size ($t = 2.82, p < 0.01, d = 0.40$).

Table 2
Comparisons between pretest and posttest scores

	Pretest		Post-test	t-value	Effect size (d)
Experimental group (n = 29)	WST	VS	WST	12.55***	0.99
	SRT	VS	SRT	17.10***	1.85
Controlled group (n = 29)	WST	VS	WST	2.82**	0.40
	SRT	VS	SRT	0	0

Notes: *** $p < 0.001$, ** $p < 0.01$

An independent-samples t-test analysis was used to examine any significant difference between the two groups of participants (experiment versus control) at the post-test time point (see Table 3). As illustrated in Figure 2, the analysis revealed that there were statistically significant differences between experimental and controlled groups in the WST post-test ($t = 3.23$, $p > 0.01$, $d = 0.85$) and the SRT post-test ($t = 7.45$, $p > 0.05$, $d = 1.96$), with large effect sizes.

Table 3
Comparisons between two groups in the post-test

Groups	Tests	Post-test	
		<i>t</i>	<i>d</i>
Experiment	WST		
Control	WST	3.23**	0.85
Experiment	SRT		
Control	SRT	7.45***	1.96

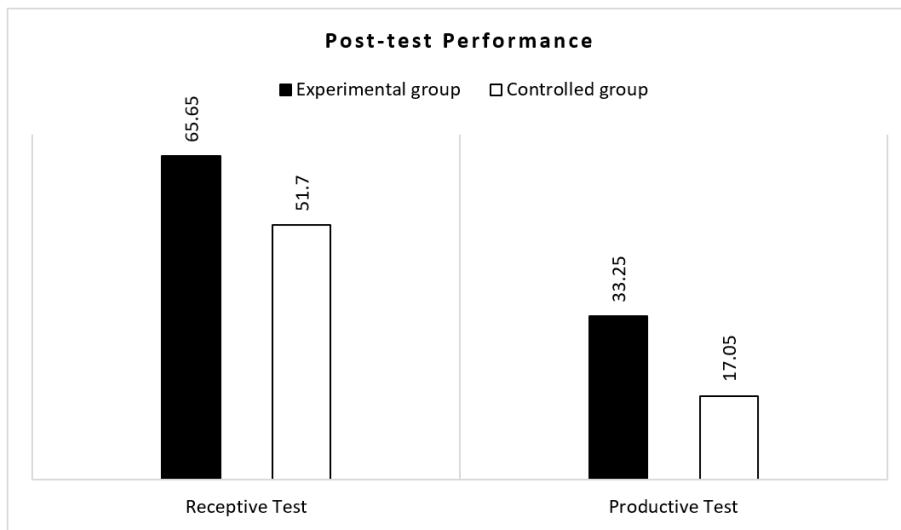


Figure 2 Post-test score between experimental and controlled groups

Participants' perceptions of instructional treatment

This section presents the results in response to Thai high school learners' perceptions of learning vocabulary through derivational suffixes. The analysis of the data from the questionnaire showed that Thai high school participants scored an average of 4.22, or 84.48% ($SD = 0.72$), indicating a high level of agreement that the derivational suffix instruction was beneficial for vocabulary learning. More precisely, the participants (92.41%) largely concurred with the benefits of derivational suffix instruction and strongly agreed that derivational suffixes facilitated learning morphologically complex words and enhanced a deeper understanding of the word. The majority of the participants (88.27%) stated that derivational suffix instruction is a valuable approach to learning and teaching vocabulary, and agreed that word families are a useful tool for learning new words. Other relevant figures are presented in Table 4.

Table 4
Students' perceptions towards the derivational suffix instruction

No	Items	Mean	SD	%	Meaning
1	Derivational suffixes help develop word knowledge	4.62	0.68	92.41	very high
2	Derivational suffix instruction is a useful approach to vocabulary learning	4.41	0.73	88.27	high
3	The notion of word families promotes vocabulary learning	4.38	0.73	87.58	high
4	Word family construct is beneficial for English language learning and teaching	4.31	0.60	86.20	high
5	Derivational suffixes foster a reading ability	4.28	0.84	85.51	high
6	My vocabulary is improved through derivational suffix instruction	4.24	0.69	84.82	high
7	Derivational suffix knowledge enhances my English language ability (e.g., grammar, meaning, and use of a word)	4.21	0.77	84.13	high
8	Knowledge of derivational suffixes enhances English grammar	4.17	0.85	83.44	high
9	Derivational suffix knowledge enhances writing skill	4.17	0.89	83.44	high
10	Word families help me see the relationship of form-meaning of a word	4.14	0.74	82.75	high
11	Word families enhance my knowledge of grammar	3.90	0.72	77.93	high
12	The notion of word families is not helpful to me	1.14	0.35	22.75	low
Total		4.22	0.72	84.48	high

According to the analysis of the quantitative data obtained from the questionnaire, the results showed that more than 80% of the students agreed that derivational suffix instruction facilitates the learning of morphologically complex words in English. This suggests that derivational suffixes are an essential element for the acquisition of complex words.

DISCUSSION

The current study examined the effect of derivational suffix instruction on English vocabulary knowledge in Thai high school learners. It also sought to explore the learners' perceptions of learning vocabulary through derivational suffix teaching. The WST and the SRT were used to measure participants' knowledge of derivational suffixes. The results showed that the experimental participants significantly outperformed their control counterparts, suggesting that derivational suffix instruction improves English vocabulary learning among Thai high school learners.

In line with previous studies (Akbulut, 2017; Kieffer & Lesaux, 2012; Matwangsaeng & Sukying, 2023), the increased knowledge of derivational suffixes could be attributed to the emphasis on explicit instruction of derivatives in an EFL classroom practice. Nation (2022) argued that explicit teaching contributed to vocabulary learning. He further explained that the gain in vocabulary knowledge resulted from learning a word through cognitive processes: noticing, retrieval and creative use. More specifically, the focus on derivational suffixes entailed directing the learners' attention to a particular vocabulary component and labelling it as an unknown

item, which leads the learner to notice the word and to recognise its salient features (e.g., orthographic and grammatical properties). In addition, when the learners recognise it, they attempt to decontextualise it, which is essential for a better understanding of the word. This process may unfold when the teacher focuses on a specific vocabulary item while explaining its meaning during teaching or when the teacher attempts to explain vocabulary items by translation, using synonyms, or providing their definition in L2.

Nation (2022) also noted that frequent retrieval of a word during explicit teaching allows learners to store it more deeply in their memory. In the current study, repetition and retrieval of the word enabled learners to recognise its meaning while being taught, and seeing or using it repeatedly provided learners with a deeper comprehension of its meaning. Indeed, repetitions contribute to developing aspects of word knowledge (Webb, 2007), and frequent meetings with a word lead to enhanced learning (Brown et al., 2008).

The concept of creative use in vocabulary learning encourages learners to reconceptualise their understanding of word formation, aiding in retaining words in their learning process. For example, when learners encounter a word like '*book*' used as a noun in one context ('*Students brought a book yesterday*') and then see it employed as a verb in another ('*Students booked tickets for a football match*'), they are prompted to explore and question the word's different meanings and usages. This process helps not only remember the word but also understand its various morphological transformations, including inflected and derived forms and changes in grammatical features and meanings (Carlisle, 2010; Nation, 2022).

Intentional vocabulary teaching, emphasizing strategies like focused repetition and memorization, has been shown to effectively enhance learners' vocabulary acquisition within a relatively short timeframe. Indeed, teaching methods incorporating derivational suffixes directly contribute to this effectiveness. Such strategies do not merely aim for learners to add new words to their repertoire, but they also facilitate a deeper understanding of word formation processes, thereby enabling learners to retain these words more effectively. This approach underscores the significance of a deliberate instructional focus on morphological knowledge, particularly derivational suffixes, in maintaining and preserving the ability to recall and use these words in appropriate contexts long after their initial acquisition, as demonstrated by the findings of the current study.

Another explanation for the increased vocabulary knowledge could be the explicit instruction of derivational suffixes. That is, deliberate teaching in English derivational suffixes facilitates learners to notice how words are formulated and can be deconstructed into smaller constituents, as illustrated in the WST (e.g., beautifully = beauty + *-ful* + *-ly*). Indeed, when learners realise that words are morphologically complex elements that can be separated into affixes or lexical items, it becomes easier for them to segment or reconstruct them. This process is distinct to, and more crucial than, memorising the meaning of the words since when learners know how to form and parse affixed words, they can invent new forms of the word using derivatives (Akbulut, 2017; Kieffer & Lesaux, 2012).

The efficacy of derivational suffix instruction could also be explained by the concept of Bauer and Nation's (1993) word family *per se*. A new form of derivational suffixes conveys linguistic properties, as shown in the SRT, which measures the derivational suffix recall (She is a *beautiful* girl (beauty)). Therefore, it can confuse learners who meet it for the first time. For instance, *final* can change into *final*, *finally*, *finalist*, or *finalise*. Another example is the derivational suffix *-er*. It is added most commonly to verbs (e.g., play-player, smoke-smoker, use-user) but productively to other grammatical categories, where it means 'a person or thing related to it.' However, the derivational suffix *-ness* is usually attached to adjectives, meaning 'state or quality of it,' according to Bauer and Nation (1993). Another example is the suffix *-ation*, which is typically added to a verb (e.g., create-creation). Such examples may become problematic to EFL learners since the meaning of the combination of the headword and its new derived form is ambiguous (e.g., hopefulness, hopelessness). Therefore, explicit instruction of English derivational suffixes is essential for learning vocabulary among EFL learners. This finding is consistent with previous studies (Akbulut, 2017; Schmitt & Meara, 1997), indicating the benefits of affix instruction.

The study also explored learners' perceptions of derivational suffix instruction in learning new words in a Thai high school. The five-point Likert scale questionnaire was administered to survey the participants' perceptions about learning vocabulary through derivational suffix instruction. The analysis of the questionnaire data showed a high level of agreement, indicating that high school students viewed derivational suffix instruction as helpful for learning morphologically complex words.

The current results are consistent with previous studies showing that derivational affixes are essential for vocabulary learning and development studies (Mochizuki & Aizawa, 2000; Nation, 2022). The positive perception of derivational suffix instruction could be because derivational suffixes are crucial word elements. The high satisfaction of learning vocabulary through word family units, particularly derivational suffixes, could also be due to the activities and tasks used. Students are given opportunities to work collaboratively, identifying the relatedness of individual components of a word. In addition, students are offered activities to parse or deconstruct a morphologically complex word. Moreover, students learn how to identify grammatical categories of the word. These activities promote a more pleasant and engaging learning environment, increasing their understanding of the nature of morphologically complex words in English, especially recognising and recalling orthographic and syntactic properties. Such activities also reinforce the student's motivation to learn new vocabulary. These findings are consistent with previous studies that word families are perceived as a facilitative strategy for learning and teaching vocabulary (Hayashi & Murphy, 2011; Laufer, 2017; Matwangsaeng & Sukying, 2023; Nation, 2022; Schmitt & Meara, 1997). Overall, the current study provides evidence to support the importance of word families, especially derivational suffixes, in the EFL context.

CONCLUSION

The current findings demonstrate the critical role that knowledge of derivational suffixes plays in the acquisition and development of vocabulary knowledge. The study points out the significant

effect that instruction on derivational suffixes has on acquiring new vocabulary for EFL students, as well as the significance of word families in both teaching and learning vocabulary contexts. Additionally, the study showed that learners had positive perceptions of learning vocabulary through deliberate teaching of derivational suffixes. In conclusion, instruction of derivational suffixes in English enhances vocabulary acquisition in both the linguistic and semantic properties of the word. As such, derivatives are essential for learning and teaching new words.

IMPLICATIONS FROM THE STUDY

This study yielded some fruitful information for pedagogical and theoretical implications. From a pedagogical standpoint, the current study implies that adding explicit derivational instruction to EFL classroom practices is worthwhile. The efficacy of deliberate teaching of derivational suffixes has already been demonstrated, and thus, this type of pedagogy should be added to English language classrooms. In addition, derivational suffix knowledge should be considered a facilitative tool for EFL learners since high school learners in the study can increase their metalinguistic strategies by thinking about the language and reflecting on their vocabulary learning process. Overall, the current study provides evidence to support the significant effect of English derivational suffix instruction on vocabulary learning. The study also highlights the significance of teaching English derivational suffixes and applying affixes' meaning and/or usage to the headword. Specifically, affix knowledge has the potential to be used not only by language teachers to guide deliberate vocabulary learning and teaching in classes but also as an essential vehicle for independent learning for language learners.

From a theoretical perspective, the current study suggests that different aspects of derivational suffixes are acquired and mastered at different speeds, as measured by the WST and the SRT. Accordingly, the study indicates that multiple formats of knowledge assessment are necessary to obtain a clearer insight into learners' affix knowledge and its roles in vocabulary learning and development. Longitudinal studies would be particularly cost-effective in this regard. In particular, research would benefit from emphasising the effect of different knowledge aspects of English prefixes and suffixes in different contexts and levels of English language abilities. Further studies on English affix learning and teaching could establish significant pedagogical and theoretical pathways for vocabulary acquisition and development.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE STUDIES

It should be noted that the participants in the current study were limited to one homogenous group of students in Thailand with similar English proficiency levels. Therefore, the current findings might not be generalisable to other contexts. In addition, the participants were selected using convenience sampling and were not randomly assigned to groups. The learning activities or tasks were also somewhat restricted due to the Covid-19 pandemic. In addition, the measures of derivational suffixes were explicitly developed for this research purpose. The study has shown the importance of affixes, particularly derivational suffixes. Accordingly, multiple assessment forms may be needed to better understand affix knowledge. Finally,



longitudinal studies would also be helpful. Indeed, additional longitudinal research with different cohorts would perhaps illustrate the incremental development of affix knowledge aspects in different contexts and language abilities.

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